3.3 Surface Water

Review of EIS Section and Previous Analysis

The 1992 Final EIS reached the following conclusions concerning the project:

- Constructing the bridge piers in the Sammamish River 100-year floodplain would affect the floodplain, as would filling some of Bear Creek's 100-year floodplain during construction.
- Construction would be timed to avoid any temporary impacts to the floodplain, and the maximum forecasted increase in water surface elevation in Bear Creek would be less than one foot downstream of SR 202.

The *Stormwater Discipline Report* (Parametrix 2006) details the current baseline conditions and the potential floodplain and stormwater quality effects of project construction and operation; this report is summarized here.

Stormwater and Floodplain

Methodology

The potential project effects were assessed based on the findings of the 1992 Final EIS, which have been updated for the new baseline conditions (completed Stages One and Two) and regulations and guidelines that have been adopted since 1992. These new regulations and guidelines were enacted by local jurisdictions (new basin plans and new shoreline and wellhead protection ordinances) and by state and federal agencies (new water quality guidelines, new stormwater regulations, and improved data for calculating pollutant loading rates and removal efficiencies of current BMPs). The following regulations reflect changes in Redmond's policies protecting sensitive resources since the 1992 Final EIS was published:

- Redmond Critical Areas Ordinance No. 2221 (City of Redmond 2005e)
- Redmond Wellhead Protection Ordinance No. 2180 (City of Redmond 2003)

Project construction and operation effects on study area floodplains and floodways and storm drainage were analyzed following the same approach as outlined in the 1992 Final EIS. The potential project effects on the Bear Creek floodway were evaluated assuming water surface elevations are not increased over one foot on Bear Creek downstream of Redmond Way (Critical Areas Ordinance 2221).

Coordination Efforts

Local and state jurisdictions aided in identifying and describing study area water resources, potential impacts, and mitigation for these impacts. Redmond staff provided helpful information on the City's regulations covering floodplains and stream buffers. They also provided useful information on the past relocation of a portion of Bear Creek adjacent to SR 520.

Affected Environment

Floodplain and Floodway

The project improvements are located within the Sammamish River floodplain and both the floodplain and floodway of Bear Creek (Figure 3.3-1). The Sammamish River floodplain and floodway have not changed since 1992 Final EIS was published; however, the Bear Creek floodplain and floodway have been modified from the areas shown in the published Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM). The Bear Creek changes resulted from past projects, including widening SR 520 in the study area. Relocating and rehabilitating part of Bear Creek adjacent to the roadway was described in a Conditional Letter of Map Revision (CLOMR) submitted to FEMA by the City of Redmond. This creek relocation affected the floodway and floodplain boundaries; however, the revisions have yet not been reflected in an approved Letter of Map Revision (LOMR) or a revised FIRM. The project impact analysis, therefore, used both the existing FIRM boundaries and information developed for the Bear Creek relocation CLOMR.

Stream Channel Features

The portion of the Bear Creek channel adjacent to SR 520 near the SR 520 and SR 202 interchange was realigned and rehabilitated during the second project construction stage described in the 1992 EIS. This relocation moved the creek channel away from and to the north of the existing SR 520 footprint in anticipation of this project's construction. No changes to the Sammamish River channel in the immediate study area have occurred since 1992.

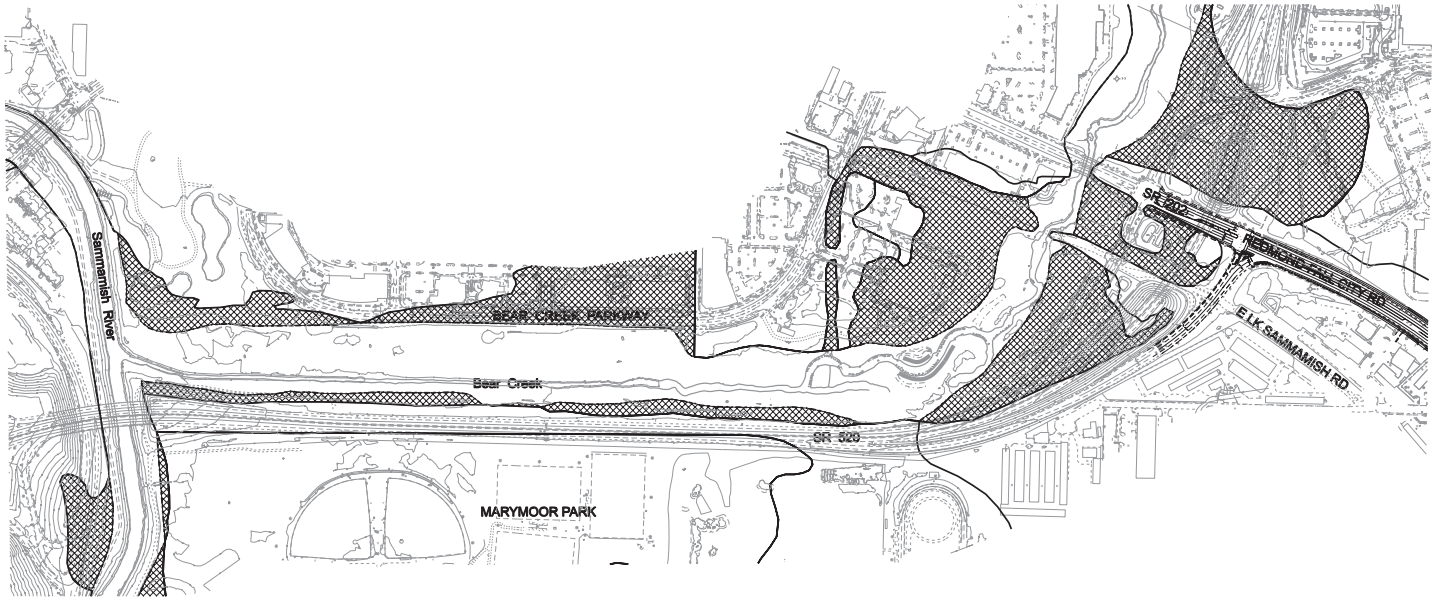
Existing Drainage Features

The project's two previous construction stages added several drainage and water quality features; these are described in Table 3.3-1 and illustrated on Figure 3.3-2.

TABLE 3.3-1
Changes to SR 520 Drainage Features in Study Area since 1992

Project Section	Changes Since 1992 Final EIS
West project limits to Sammamish River	No drainage features changed during Stage One.
SR 520 mainline from Sammamish River to SR 202 ramps	A new bioswale along the south side of this section was added during Stage One
SR 520 mainline from SR 202 ramps to Burlington Northern Railroad crossing	A wetpond on the west side of the Burlington Northern Railroad added during Stage One.
SR 520 from Burlington Northern Railroad crossing to SR 202 interchange	A wetpond was added between Burlington Northern Railroad and SR 202 during Stage One.
SR 520 from SR 202 to Union Hill Road	No drainage features changed in this section during Stage One.

Source: Parametrix

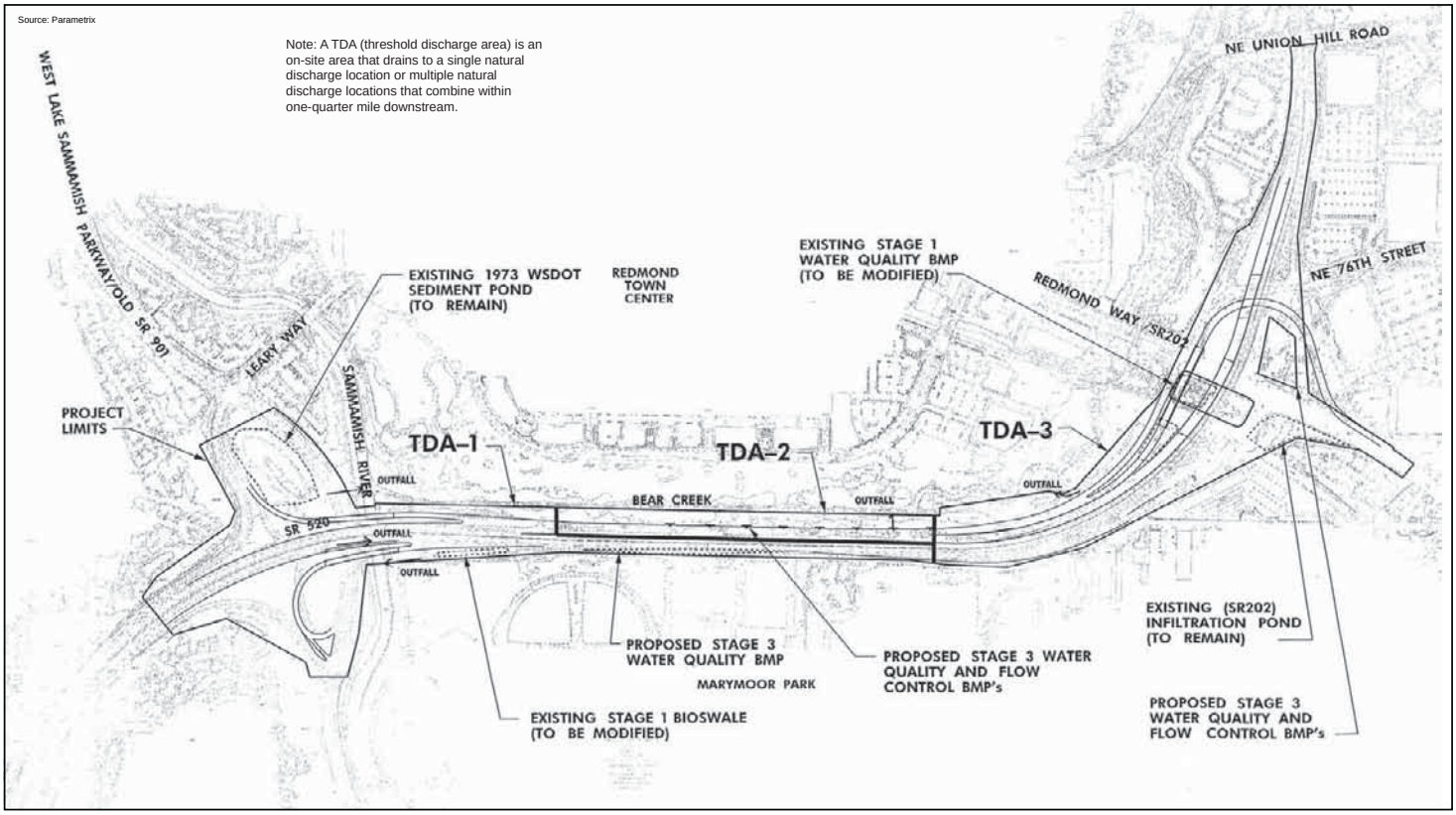


LEGEND

FEMA 100-year floodplain limit
FEMA floodway limit
Floodway
FEMA floodway limit
FEMA 100-year floodplain limit

0 200 400
Scale in Feet

FIGURE 3.3-1
Existing FEMA Floodplain and Floodway Affected by the Project
SR 520/West Lake Sammamish Parkway to SR 202



N

0 250 500

Scale in Feet

FIGURE 3.3-2
Existing and Proposed BMP Location Map
SR 520/West Lake Sammamish Parkway to SR 202

Impacts

Figures 3.3-3A and B depict the project's encroachment into the floodway shown on the published FEMA FIRM. These figures also show the extent of encroachment into the revised floodway that resulted from relocating Bear Creek during a previous construction stage of the SR 520 widening project. This revised boundary was described in the CLOMR submitted by the City of Redmond to FEMA. The revision proposed in the CLOMR has not yet been published in a revised FIRM for the area. The analysis for the current project used the previously defined floodway boundaries, as well as those proposed as a result of the relocation to determine the extent of any impacts.

Figures 3.3-3A and B show the project improvements would encroach into both defined floodways. Red tick marks show the boundaries of the proposed revised floodway.[1])

Figures 3.3-3A and 3.3-3B also show the location of potential encroachment at cross-sections depicted on Bear Creek; Table 3.3-2 details this information as well. Floodway encroachment can result in an unacceptable rise in water surface elevation during a 100-year flood. Consequently, the analysts also examined the potential water surface elevation change for the 100-year flood from the project's construction. Redmond regulations define a floodway with an allowable increase of up to one foot in the water surface elevation of the 100-year flood. Table 3.3.2 shows that the project floodway would not exceed allowable thresholds for impacts to the Bear Creek floodplain.

TABLE 3.3-2
Floodplain Related Impacts to Bear Creek

FEMA Cross-Section Identifier	"Existing" Cross-Section Identifier	Project Encroachment into FEMA Floodway	Project Encroachment into CLOMR Floodway	Change in Water Surface Elevation from project Encroachment into CLOMR Floodplain (ft)[1,2]
A	1	No	No	1
	2	No	No	0.44
	3	No	No	0.44
	4	Yes	Yes	0.54
	5	No	Yes	-0.06
B	6	No	Yes	0.04
	7	No	No	0.09
	8	No	No	0.17
	9	Yes	No	0.28
	9.5	Yes	No	0.31

[1]The lower reach of Bear Creek extends from cross-section 1 through 8, while the upper reach extends from cross-section 9 through 19.

TABLE 3.3-2
Floodplain Related Impacts to Bear Creek

FEMA Cross-Section Identifier	"Existing" Cross-Section Identifier	Project Encroachment into FEMA Floodway	Project Encroachment into CLOMR Floodway	Change in Water Surface Elevation from project Encroachment into CLOMR Floodplain (ft)[1,2]
C	10	Yes	No	0.3
	12	No	No	0.31
	12.5	No	Yes	0.31
D	13	No	No	0.33
	14	No	No	0.37
	15	No	No	0.52
E	16	No	No	0.71
	17	No	No	0
	18	No	No	0.17
F	19	No	No	0.24

[1]Water surface elevation corrected to the WSDOT base map datum
[2]In areas where there is encroachment the change in water surface never exceeds one foot.
CLOMR Conditional Letter of Map Revision
FEMA Federal Emergency Management Agency
ft feet

Based on this evaluation, neither scenario results in 100-year flood-water surface elevation increases of greater than one foot at any location. The greatest increase (0.75 foot) is predicted for cross-section 16, which is located in the upper stream reach; this stream reach was previously evaluated in conjunction with the Bear Creek relocation project.

Mitigation Measures

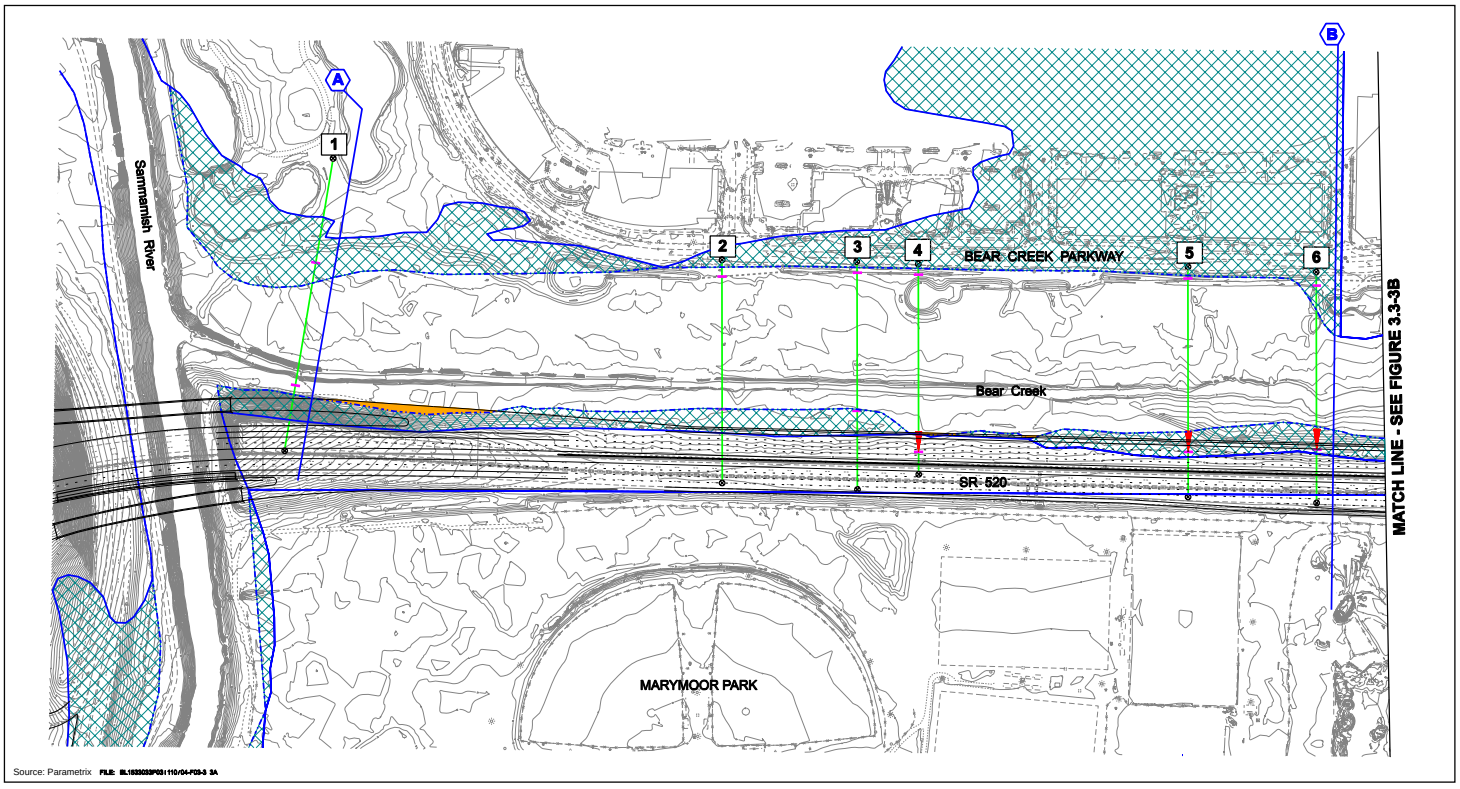
The project improvements would not result in a one-foot or greater rise of flood waters for the Bear Creek 100-year flood. Thus, the project is consistent with the City of Redmond Critical Area Ordinance requirements, and no project design changes and no mitigation are required.

Water Quality

Methodology

Water quality effects from the project construction and operation were analyzed using methodology similar to that used in the Final 1992 EIS. Changes to regulations and guidance since that date are listed below:

- Revised impacts and mitigation sections reflecting new stormwater regulations (WSDOT 2004c)



Source: Parametrix FILE: BL1933039P03 I:110/04-P03-3 3A

0 100 200
Scale in Feet

FEMA 100-year floodplain limit
FEMA floodway limit
Floodway
FEMA floodway limit
FEMA 100-year floodplain limit

1 CLOMR model cross-section

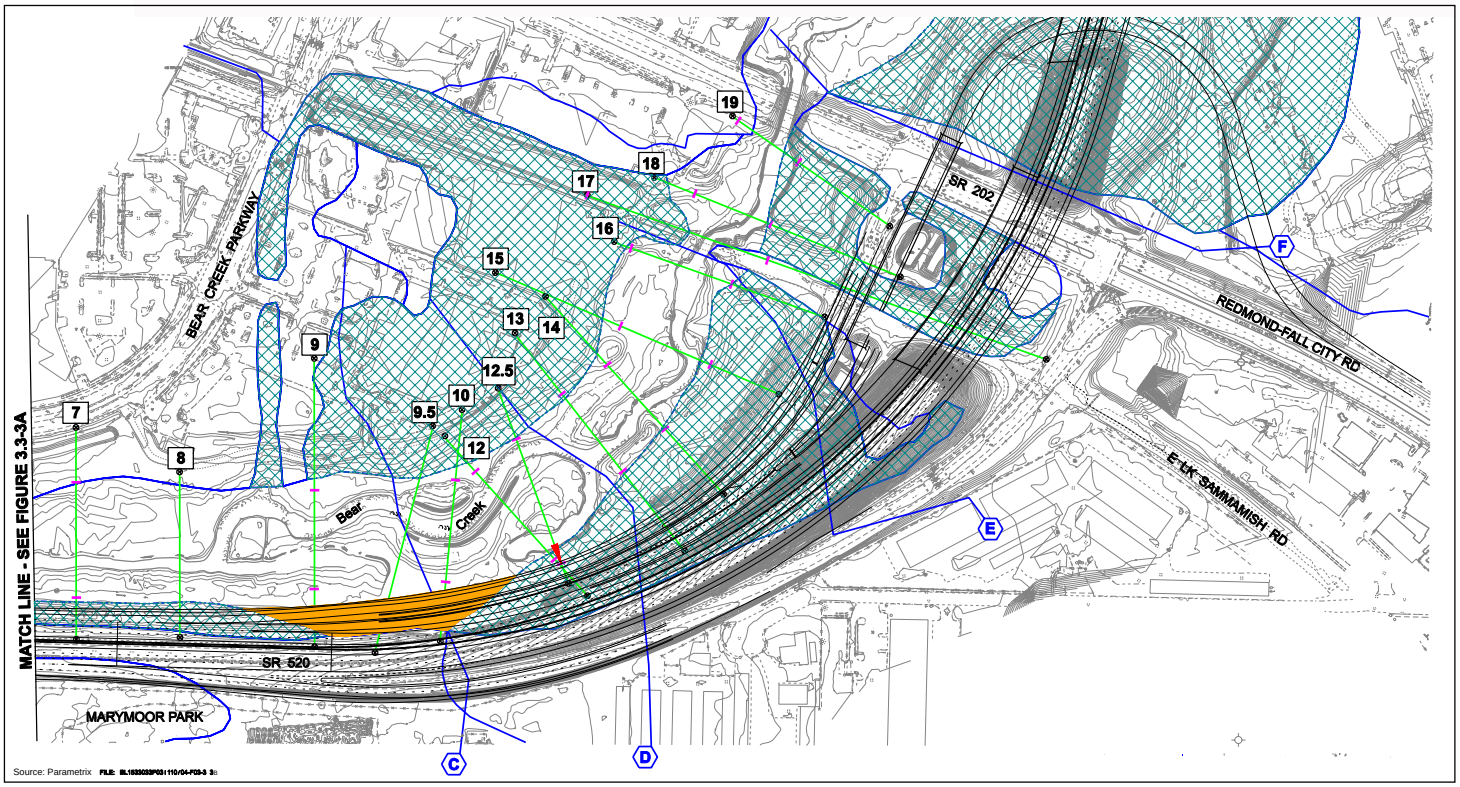
D FEMA cross-section

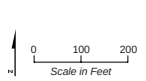
Floodway encroachment stations based on CLOMR model

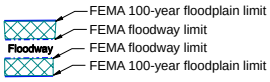
CLOMR floodway encroachment

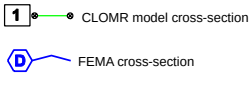
FEMA floodway encroachment

FIGURE 3.3-3A
Bear Creek Floodplain and Floodway Encroachments
SR 520/West Lake Sammamish Parkway to SR 202









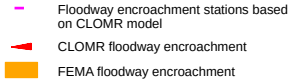


FIGURE 3.3-3B
Bear Creek Floodplain and Floodway Encroachments
SR 520/West Lake Sammamish Parkway to SR 202

- Updated roadway pollutant loading rates and removal efficiencies of current BMPs (WSDOT 2005a; WSDOT 2005e)
- Updated Highway *Runoff Manual* (WSDOT 2004c)
- Current data from the *WSDOT 2004 National Pollutant Discharge Elimination System (NPDES) Annual Progress Report* (WSDOT 2004a), which represent runoff from highways with high average daily traffic volume (90,000 to 160,000 trips) in western Washington (WSDOT 2005d) to calculate pollutant loading.

Additional regulations and guidance documents used in this evaluation that have been modified and updated since the original 1992 Final EIS was published include the following:

- Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201a)
- *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology [Ecology] 2005a)
- Redmond Critical Areas Ordinance No. 2221 (City of Redmond 2005e) (this regulation prohibits installing water quality treatment facilities in stream buffers)

The 1992 Final EIS identified the impervious surface increase and the associated pollutant-loading increase as the main impacts from the project improvements. During the final project design for Stages One and Two, refined calculations resulted in the total acreage of impervious surface--both existing and proposed—increasing over the amount reported in the 1992 Final EIS; these increases are shown in Table 3.3-3. The new analysis completed for this project, which used the more definitive totals, has measured approximately 12.3 acres of new impervious surface associated with this project.

TABLE 3.3-3
Amount of Existing and Proposed Impervious Surface Evaluated in the 1992 Final EIS Compared with this Project

	Existing Impervious Surface (acres)	Proposed Impervious Surface (acres)
1992 Final EIS	20.0	31.5
Current Project[1]	24.7	37.0
Difference	4.7	5.5

[1]See *Stormwater Discipline Report* (Parametrix 2006) for a more detailed discussion about increased impervious surface with construction of this project.

Coordination Efforts

Representatives from local and stage agencies aided the design team in early identifying sensitive resources and issues in the study area. WSDOT presented the early project design to the Multi-Agency Permitting (MAP) Team. This team, comprising personnel from the Washington Department of Fish and Wildlife, Ecology, U.S. Army Corps of Engineers (USACOE) and King County, provided information on sensitive resources and mitigation requirements for project impacts.

Affected Environment

It is important to identify the beneficial uses of a water body so that pollution impacts can be assessed. Each water body (e.g., streams, lakes, and bays) has a unique value to the natural and human environment and warrants careful consideration of its protection. The beneficial use of water is defined under federal law in the Clean Water Act and ranges from water supply, seafood rearing, spawning and harvesting, wildlife habitat, recreation, commerce and navigation, and aesthetics. Under state and federal laws, the beneficial use of water is protected from degradation.

The Sammamish River and Bear Creek are the two major surface water resources in the immediate study area. Ecology has designated several beneficial uses for them, including water supply, salmon and trout use, recreation, and boating. Both resources have been extensively modified by channelization to restrict flooding in the valley and to lessen associated impacts to residents and farming. Stormwater runoff from area roadways, parking lots, and commercial and residential areas typically infiltrates into the soil or discharges directly (either treated or untreated) into both streams.

Impacts

Construction

Project improvements construction could potentially affect water quality in the study area, including that of the Sammamish River and Bear Creek. This is typically through the effects of stormwater runoff and erosion during earth-moving activities.

Slope stability generally would not be a concern in the study area due to the flat topography. The Sammamish River banks would be the most sensitive to the effects of clearing, grading, and placing construction equipment (i.e., cranes); this is because of the height and steepness of the banks. The west bank would be more sensitive due to its natural condition; the east bank is armoured with large rocks. The proximity of the highway widening to Bear Creek would increase the potential to adversely affect water quality. Throughout the project limits, the potential for accidental spills of construction-related hazardous could affect water quality in both the Sammamish River and Bear Creek.

Constructing new bridges over the Sammamish River at the project's west end would involve working near and over the river. Piers supporting the bridge would be located outside of the ordinary high-water mark (OHWM); no in-water work is anticipated in either Bear Creek or the Sammamish River.

Accidentally spilling hazardous materials anywhere within the project limits could potentially affect water quality in the aquifer recharge areas that supply Redmond's drinking water.

Operation

The potential effects of the project improvements to study area water quality would not cease once the project is constructed. Over the life of the improvements, vehicles would still contribute pollutants to stormwater, and accidents could result in the release of hazardous

materials to the environment. As mentioned above, the project would create approximately 12.3 acres of new impervious surface. Over time, this increased impervious surface added to the watershed could change runoff patterns and quantities released to area streams. On the Sammamish River watershed scale, however, the project impacts would likely be undetectable. Because the Sammamish River is exempt from flow-control requirements, the project does not incorporate flow control BMPs for project stormwater draining to the Sammamish River. The project would provide flow control for stormwater draining to Bear Creek to minimize flow increases to the creek. The project would not result in a detectable pollutant increase affecting the impairment level of the Sammamish River and Bear Creek for dissolved oxygen, fecal coliform, and temperature.

While this project supports growth that has been planned and approved, this project could indirectly affect water quality by supporting development in areas in and around Redmond. More development would result in increases in impervious surface and pollutant point and nonpoint sources that could adversely impact surface waters in the Sammamish River watershed.

The project improvements to SR 520 would support planned growth in the local area. By doing so these improvements could contribute indirectly to the increase in impervious surface and the potential for effects on water quality in the Sammamish River watershed; this contribution would be insignificant.

No-Action Scenario

Under the No-Action Scenario, the increased traffic over time would contribute ever-increasing pollutants to the stormwater discharged to drainage features in the study area. Pollutant concentrations would increase, and WSDOT would not build new water-quality features except where future spot improvements would be constructed such as at intersections.

Mitigation Measures

Adverse water quality effects from construction activities would be avoided, minimized, and mitigated through the same approach described in the 1992 Final EIS, namely by developing and implementing a TESC plan, which would specify BMPs to be installed before construction activities and implemented during construction. During construction WSDOT would have an environmental compliance inspector on site to inspect the initial BMP installation, assure compliance with the TESC plan, and monitor the plan's effectiveness for protecting water quality. During the long-term operation of the roadway improvements, WSDOT maintenance personnel would monitor and maintain water quality devices, such as the storm filters, vaults, and stormwater ponds, to assure their continued effectiveness.

Accidentally releasing and spilling hazardous material (during project construction) would be avoided, minimized, and mitigated by developing and implementing a spill prevention, control, and countermeasures (SPCC) plan, which would be developed by the project contractor for WSDOT review and approval. The SPCC would be in effect for the life of the construction contract. Spill response during the roadway's long-term operation would be shared by WSDOT's Incident Response Team and the Washington State Patrol, who respond to accidents on Washington State highways. Both teams would carry limited equipment to prevent hazardous materials from spilling beyond the road. A defined protocol would be in place to have qualified personnel respond to large spills.

The project improvements would include water quality features to treat stormwater runoff before it is released to the environment; these features, which are shown on Figure 3.3-2, would include a settling pond, a water quality wet pond, and a bioswale located to the south of the roadway. Some of the water quality treatment features from previous construction stages would be modified to treat stormwater for the complete project. New features constructed for the project would include new ponds and permanent water quality and flow control BMPs that would be finalized with the completion of the project hydraulics report.